COURTESY OF U.S. ARMY

NSG GEOINT Standards Initiative

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Recently I upgraded my cellular phone. It wasn't until I went to charge my new phone that I learned I would need to purchase a new car charger and home charger to fit this particular model. Eighty-six dollars and change later, I had the tools I needed for interoperability.

Mandating the standardization of cell phones and cell-phone parts — my thought as I parted with $86 — would force a crushing blow to consumerism and the options it makes possible. But, in the world of modern-day intelligence and defense, standardization in net- and datacentric environments could mean the difference between life and death.

Standardization of geospatial data could hypothetically mean the difference between the accidental bombing of a noncombatant position rather than hitting an enemy target. Let's say, for example, the U.S. Army uses an *X* to identify the enemy position on a geospatial image, but the U.S. Air Force uses a *Y* for the same position. This could cause dangerous confusion when the soldier on the ground is providing Air Force aircraft with real-time targeting information. In the geospatial-intelligence community, a special working group has been developed to address standardization issues, mandate interoperability, and ensure that such issues are addressed before they become a problem.

Origins of the GWG

In late 2004, the director of the National Geospatial-Intelligence Agency (NGA), retired Air Force Lt. Gen. James R. Clapper, Jr., tasked the National Center for Geospatial Intelligence Standards (NCGIS) to form a working group aimed at the needs of the National System for Geospatial-Intelligence (NSG) community. The working group's mission is to identify and implement GEOINT standards working as a community to ensure system and information interoperability. By January 2005, the group had formed the Geospatial-Intelligence Working Group (GWG) and held an inaugural meeting (see "GWG's Organizational Structure" sidebar). Bobbi Lenczowski, senior executive NGA West, presented the keynote address, highlighting for everyone the practical needs and difficulties in achieving standardization and recognizing that "interoperability cannot happen without standards and standards agreements."

The GWG aims to address the serious problems and challenges before the NSG — such as uncoordinated GEOINT standards development, inconsistent implementation of standards, and the lack of a centralized GEOINT standards registry — to enable interoperability across the NSG. The GWG was not created to replace successful, existing GEOINT standards-

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development activities and standards-setting organizations. Rather, it exists as an open umbrella for expanded communication and collective effort, driving development and eliminating duplication.

For example, the National Imagery Transmission Format Standard Technical Board (NTB), established in the late 1980s, has long served as a focal point for imagery-related standards activities within the Department of Defense (DoD), other Intelligence Community (IC) organizations, and nonintelligence civil agencies that produce and use remotely sensed digital imagery.

"The NTB looks forward to our participation with the GWG as a welcome forum to help ensure our efforts are properly targeted and prioritized," said Stephen Kerr, chair of the NTB and newly appointed chair of the GWG's Still Imagery Focus Group. "We can't afford efforts wasted by duplication or ragged overlap. We must provide a venue for increased coordination of standards with other geospatial standardization activities across both the NSG and private sectors," he concluded.

The NTB, Motion Imagery Standards Board, Intelligence Community Metadata Working Group, and Community Sensor Model Working Group are just several examples of existing entities coordinating with the GWG.

The GWG in Practice

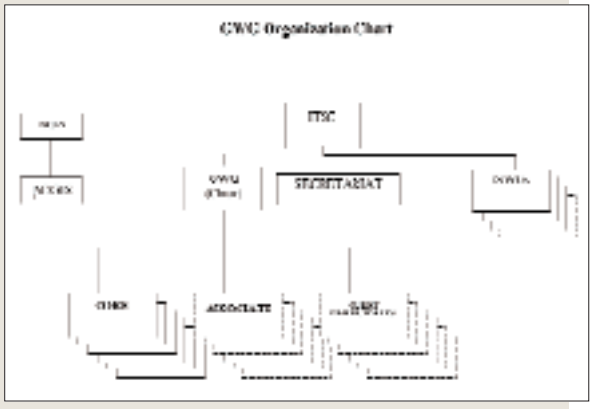
The GWG serves two primary purposes. First, it serves as a technical working group under DoD's Information Technology Standards Committee. In this role, it recommends the adoption of standards to the DoD IT Standards Registry (DISR), helping to create a centralized database to better enable the discovery, access, integration, dissemination, exploitation, and interoperability of GEOINT. Using the DISR online tool (https://disronline.disa.mil), GWG core members review current or emerging GEOINT standards, seek advice from their agency's technical and acquisition experts, and report in GWG meetings about their position on the standard (See Figures 1 and 2 on page 31).

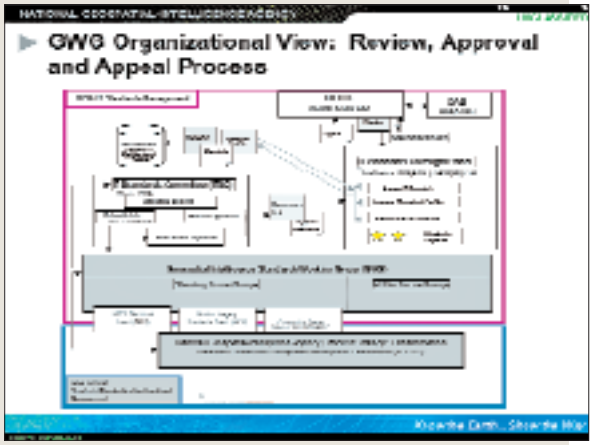
An example of the GWG at work was an ad-hoc meeting held in February 2005 to review 10 standards already in the DISR. Core members reviewed the standards via DISR online then came to together via telephone to review them. Members were polled at the end of each standard discussion. Votes indicated agreement with the recommended

GWG'S ORGANIZATIONAL STRUCTURE

The organizational structure of the Geospatial-Intelligence Standards Working Group consists of a chair occupied by the director of NCGIS; a secretariat provided by the chair (NCGIS); core members with primary authority and responsibility toward gathering consensus; associate members who serve as subject-matter experts to the GWG (to include NATO organizations and coalition partners); and guest participants from across the NSG and private industry that supply technology supporting GEOINT. Anyone interested in facilitating the adoption, promulgation, and use of GEOINT standards for enabling technologies, data architectures, and software tools is encouraged to participate.

The GWG Charter can be viewed on the DISR Web site at https://disronline.disa.mil. For more information or to join the GWG, contact the GWG secretariat via NCGIS-Mail@nga.mil.





The GWG organizational chart (top) and members (middle). GWG's review, approval, and appeal process (bottom) solicits input from subject-matter experts but tries to minimize meeting-time overkill for participants.

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action (mandate, retire, or keep as emerging) for nine of the 10 standards on the table. The one contentious standard will be reviewed in a GWG focus group, allowing a community of subject-matter experts to offer their recommendations and concerns and eventually come to community consensus. The DISR tool allows for much of the change-request work to be done online or by phone, minimizing meeting overkill for participants. Specific procedures for its use are determined by the Defense Information Systems Agency on DISR online.

GWG's second task is to carry out NGA's role as functional manager for GEOINT standards by providing a community-based forum to advocate and address standardization issues for NSG. This standards-focused forum exchanges information and discusses issues, identifies emerging standards, provides advice on the need to develop new standards, coordinates the development of new standards or specifications when appropriate, and serves as the subject-matter expert within the DoD and the IC for GEOINT standards matters.

"GEOINT standards and interoperability must be addressed by the community as a whole," stated Karen Irby, director of NCGIS and chairperson for the GWG. "With so much at stake, we can no longer afford to go it alone. Our goal is the harmonization of standards activities that enable net- and datacentric interoperability and promote innovative partnerships."

SUMMARY OF CURRENTLY PROPOSED STANDING GWG FOCUS GROUPS

GWG FG Name	POC	Focus Description	
National Imagery Transmission Format Standard (NITFS) Technical Board (NTB)	Steve Kerr NGA/NCGIS 520-538-5154 Stephen.W.Kerr@nga.mil ntbchair@nga.mil NTB URL is: http://ismc.nga.mil/ntb/	The NITFS Technical Board (NTB) is the technical focal point for imagery and imagery-related standardization activities within the GEOINT community. The mission of the NTB is to facilitate the development, selection, adoption, profiling, application, implementation, and testing of standards essential to establishing interoperability and quality for still imagery, associated metadata, and other related aspects within the National System for Geospatial-Intelligence (NSG). The scope of the NTB extends beyond the traditional bounds of the NITFS suite of standards. The standardization topics include: ■ Still imagery and gridded data ■ Imagery and gridded data formats ■ Imagery and gridded data compression ■ Graphical, textual, and other means to annotate imagery and imagery products	■ Imagery-related support data and metadata ■ Imagery-derived data and metadata, to include foundation data ■ Image Quality The NTB physically meets as needed, typically three times per year. NTB business and coordination is also accomplished via electronic means. **To subscribe to the NTB Mailing List:** ■ Send an email to lyris@goldweb.nga.mil (no subject required) ■ Type the following text in the body of your email message: subscribe ntb <your email address — no brackets> "name" your name must be in double quotes.
Motion Imagery Standards Board (MISB), formerly MISC	John Zabitchuck NGA/InnoVision 703-262-4542 John.Zabitchuck@nga.mil	The Motion Imagery Standards Board (MISB) monitors, defines, and participates in the development of, and changes to, proposed standards to insure interoperability and maintain quality of motion imagery, associated metadata, audio, and other related systems. The MISB will monitor and participate in changes to, and the implementation of, related motion imagery, metadata, audio and associated systems standards in national and international arenas for impacts to DoD Architecture Framework (DoDAF), NGA Systems, and the IC. The defining document for motion imagery standards, maintained by the MISB, is the Motion Imagery Standards Profile (MISP), currently at version 3.1. There are currently five working groups:	■ Advanced Motion Imagery WG ■ Interoperability WG ■ Metadata WG ■ Infrared WG ■ Advanced Compression WG The MISB and its associated working groups meets typically three times per year, with ad hoc working group meetings as needed. The MISB also runs an Interoperability Lab, open to the community and vendors working motion imagery areas for the government. The MISB directly interacts with the SMPTE, ISO, and ITU organizations. The MISB maintains a public Web site at http:\ismc.nga.mil\misb.
Community Sensor Model Working Group (CSMWG)	Neil Sunderland GWG Coordinator to the CSMWG SeiCorp/NGA, NCGIS 703-222-9722 nsunderland@seicorp.com	The CSMWG is a collaborative environment to support a coordinated community approach for the development, verification, validation, maintenance, standardization, and configuration management of sensor models. The mission of the CSMWG is to ensure all sensor models identified and designated to support NSG geopositioning services, production, and applications are based upon, and compliant with, consensus-based community standards. CSMWG's mission is additionally to ensure that standards-compliant sensor	models are usable by multiple applications across the NSG. The promulgation of a Technical Requirements Document (TRD) and attendant appendices will serve as a direct expression of the CSMWG mission and serves as the master baseline standards document prepared and managed by the CSMWG. CSMWG administers a Sensor Model Configuration Control Board (SMCCB) to track recommended changes/enhancements to the Community Sensor Model TRD and appendices.
GEOINT Reporting Focus Group (RFG)	David Irvin NGA/Acquisition 703-755-5455 david.l.irvin@nga.mil	The mission of the RFG is the standardization of reporting based on GEOINT exploitation to enable interoperability and information sharing across the GEOINT community. Intelligence Reporting is the preparation and conveyance of information by any means — more commonly, the term is restricted to reports prepared by an analyst for dissemination of finished intelligence. The RFG will deal with those aspects of the standardization of GEOINT	relating to the format and structural contents of intelligence reports derived from the exploitation of imagery and geospatial information. This includes but will not be limited to text-based reporting, bit-oriented reporting, and graphical reporting. Initial focus will be on harmonization of NSG EARS-based reporting with community standards, but other topics that have been recommended include Advanced Geospatial Intelligence (AGI), Web presentation, and migration to XML-based reporting.

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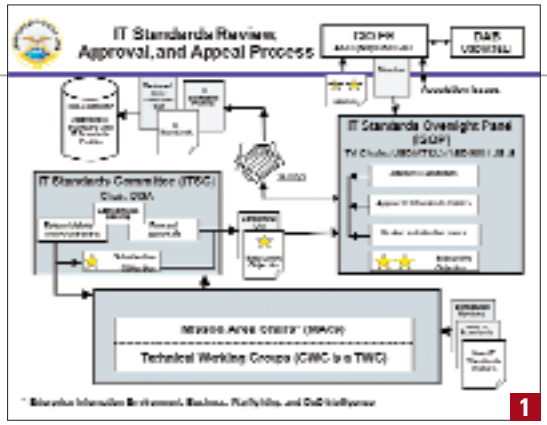

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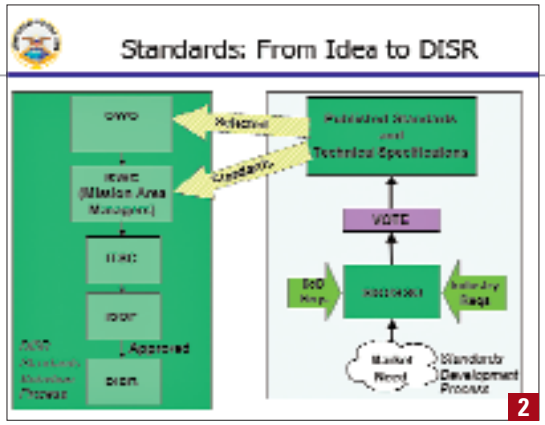

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◀ **FIGURE 1.** The GWG serves as a technical working group under DoD's Information Technology Standards Committee.

◀ **FIGURE 2.** GWG aims to streamline the decision-making process from an idea to an accepted and published standard using the DoD IT Standards Registry.

Under the Umbrella

To foster the broadest consensus and technical convergence of the foundations of GEOINT — including aspects of the mathematical, scientific, acquisition, and analysis disciplines — the GWG has given associate membership (a technical advisory role) to both the Open Geospatial Consortium (OGC) and the U.S. Geospatial Intelligence Foundation (USGIF).

"Geospatial intelligence has become, in a very real sense, the cornerstone of our national and homeland security through its place at the functional center of many diverse intelligence issues," said John Moeller, chair of the USGIF Technical Committee. "Now, the private sector is experiencing a similar convergence of geospatial-intelligence disciplines. Our advisory participation in the GWG. . . is reflective of USGIF's

GWG FG Name	POC	Focus Description
Application Schemas for Feature Encoding Focus Group (ASFE)	Cliff Daniels NGA/NCGIS 703-814-4577 DanielsC@nga.mil	Feature Encoding is defined as the conversion of data into a series of codes. The ASFE will be responsible for those aspects of GEOINT standardization related to data structures, exchange, and storage of geospatial intelligence. This may include data format, feature and attribute coding schemes, exchange media, administrative procedures, representations of geographic feature geometry, feature attribution information, and other geographic information.
Geographic Portrayal Focus Group (PFG)	Dan Gleason NGA/NCGIS 703-814-4575 GleasonD@nga.mil	Portrayal is the presentation of information to humans. The PFG will deal with those aspects of the standardization of GEOINT relating to the visual depiction of physical features and geographically referenced activities. This includes: ■ Human to media interface aspects, such as visual symbolization of GEOINT and symbol design, for both digital display and hardcopy media ■ Rules and behaviors of GEOINT symbols that may be necessary to ensure consistent rendering across the community ■ Interoperability in the exchange of portrayal information among the GEOINT community. The PFG will coordinate activity with other focus groups under the GWG and with other portrayal working groups under the ITSC. The DOD Symbology Standards Management Committee (SSMC), which is a focus group under the Warfighter Technical Working Group of the ITSC, has overall responsibility for coordination of symbology requirements across the US Department of Defense, including the responsibility to develop and maintain complete joint symbology to meet DOD warfighter requirements.
Metadata Focus Group (MFG)	Norm Andersen NGA/NCGIS 703-814-4565 Norman.C.Andersen@nga.mil	The Metadata Focus Group (MFG) deals with those aspects of the standardization of GEOINT relating to imagery, sensors, and geospatial metadata. Metadata is used by a large population of users other than the producer of the metadata. Usually, it is created by someone and used by someone else. Standardizing the structure and use of metadata will provide creators with appropriate information to characterize the data. Furthermore, standardizing the use of metadata will enable users to effectively implement the metadata to facilitate the most efficient method to discover and retrieve the associated data. The MFG coordinates activities between the various recognized organizations and assumes a leading role in the development of standardized metadata in their respective communities. The organizations currently taking an active role in these activities, which include: ■ Aeronautical Information eXchange Model/Aeronautical Information Content Model (AIXM/AICM) Feature Harmonization Effort ■ American National Standards Institute — InterNational Committee for Information Technology Standardization/Geographic Information (ANSI - INCITS/L1) ■ Digital Geographic Information Working Group (DGIWG) ■ Distributed Common Ground Systems Multi-Service Execution Team Metadata Working Group (DCGS MET MD WG) ■ Federal Geospatial Data Committee (FGDC) ■ Intelligence Community Metadata Working Group (IC MWG) ■ International Organization for Standardization (ISO) Technical Committee 211 ■ Multinational Geospatial Co-Production Group (MGCP) ■ NATO Air Group IV (AGIV) ■ Open Geospatial Consortium (OGC).
Information Transfer & Services Architecture	Dr. Charles Roswell NGA/NCGIS 703-814-4566 RoswellC@nga.mil Glenn Guempel NGA/NCGIS 703-814-4563 GuempelG@nga.mil	The Purpose of the Information Transfer and Service Architecture Focus Group is to serve as a community-based technical advisory group to the GWG forum dealing with matters related to information transfer and architecture of GEOINT services. Information transfer is the movement of information from one system to another. Important are the "data services" that provide for posting, discovery, access, and analysis of GEOINT data stores and information stores in a distributed, real-time environment. Additional services are required for positioning, cataloguing, portrayal, change detection, and so on. Careful attention will be given to the underlying Service Oriented Architecture (SOA) in order to ensure upward compatibility, plug-and-play services and components, and conformance with the market mainstream. Of special interest are emerging service architecture components and technologies such as OWS, UDDI, WSDL, SOAP, XML, and J2EE. The standards forwarded by this Focus Group are of interest to developers of services and service architecture components within a distributed, collaborative, geospatial environment, and by advanced designers of service algorithms, service chains, and service-to-service interfaces. The GEOINT service architecture standards are technologies that enable service-chaining interoperable service components. Agreements made here enable automata to mingle services from multiple sources, and thus create and employ one-of-a-kind service chains, and yet have assurance that the result will be the accurate operational picture intended.

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▶ **FIGURE 3.** The GWG members include existing standards-setting organizations and users of GEOINT. GWG participation status is open to anyone who wishes to contribute to this important work.

own overarching aim of bringing together the many disciplines in the geospatial-intelligence sector to share best GEOINT practices and promote the education and importance of a national geospatial-intelligence agenda."

OGC's representation on the GWG will help to maintain a dialog with OGC members regarding advancement of standards-based, interoperable solutions. The OGC represents a diverse collection of developer and user communities worldwide, working in a consensus process to advance standards that promote interoperability within and across many different communities of use. Also important to the GWG is OGC's work to promote standards that are consistent with broader net-centric, enterprise architectures.

Other advisory agencies participating in GWG include the International Organization of Standards, Digital Geospatial Information Working Group, NATO Air Group IV, and coalition partners. The Federal Geographic Data Committee represents the civil community as a GWG Core Member (see Figure 3).

The Standard Focus

The GWG focuses on GEOINT standards that enable interoperability in net- and datacentric environments and are relevant to enabling technologies, data architectures, and software tools. GEOINT standards are defined as those that enable the discovery, access, integration, dissemination, and exploitation of GEOINT and include, but are not limited to imagery content, format, and compression; geographic portrayal; GEOINT information transfer; advanced geospatial intelligence (imagery-derived measurement and signature intelligence); geographic feature encoding; metadata; and intelligence reporting.

The GWG published a charter and standard operating procedures in March 2005 that provides for three general meetings annually and the ability for any participant to request an ad-hoc meeting pending the GWG core membership's approval. The general meetings are open to anyone interested in GEOINT standards, are meant to brief on standards activities, and provide educational information.The GWG held its second general meeting April 27, 2005, with General Clapper presenting the keynote address and the USGIF conducting a high-tech interoperability demo (see www.usgif.org for information on this demo).

The GWG uses domain-specific focus groups (standing and ad-hoc) for addressing standards issues. Groups may be established by the GWG chair or by a core member to address a specific problem. At the April general meeting, eight standing GWG focus groups were proposed (see table titled "Summary of Currently Proposed Standing GWG Focus Groups"). All of the focus groups were assigned general issues that were collected from core members and participants at the GWG inaugural meeting and from change-request reviews for the July DISR cycle. Information about focus-group meetings will be posted on DISR online.

The current standing focus groups will review a series of change requests in the DISR, brief core members on the collective NSG position on those requests, and poll core members on the requests by the July DISR cycle. Results will be posted online and discussed at the next general session, which is slated for November.

GLOSSARY

DISR: DoD IT Standards Registry

DoD: Department of Defense

GWG: Geospatial-Intelligence Working Group

IC: Intelligence Community

NCGIS: National Center for Geospatial Intelligence Standards

NGA: National Geospatial-Intelligence Agency

NSG: National System for Geospatial-Intelligence

NTB: National Imagery Transmission Format Standard Technical Board

OGC: Open Geospatial Consortium

USGIF: U.S. Geospatial Intelligence Foundation